AVSIM Comercial FSX Aircraft Review

Boeing 707-300

Product Information		
Publishers: Captain Sim		
Description: The venerable Boeing 707.		
Download Size: 129 MB + 7MB for Manuals	**Format:** Download	**Simulation Type:** FSX
Reviewed by: Alan Bradbury AVSIM Staff Reviewer - June 27, 2011		

An old jet in a newer sim

Captain Sim released their FSX 707 some time ago, but with it having gone through a few patches and generally being well sorted out to the point that they are releasing expansions for it, now is an appropriate time to take a look at it in some detail, which is what this review will do.

You can skip down to the **'You've got to roll with it'** sub header below the first pictures in this review if you only want to read about the CS 707, but if you want to know a bit about the real 707 and how it became a success, read on for a potted history.

First, a little story…

When I was a kid in the 1970s, I went on holiday to Spain on a Dan Air London de Havilland Comet airliner, but when it was time to fly home at the end of my holiday, I learned from a slightly flustered airline representative that the Dan Air Comet had departed to England several hours earlier for some maintenance with only a few of the passengers who had chanced to be at the airport early on board it. So in its place another English-based aircraft was rapidly chartered and dispatched to Spain in order to fly the remainder of us sunburned passengers home.

Most were annoyed at having to wait, but not me, I was enjoying spending more time at the airport, watching stuff that night with my face pressed up against the windows of the departure hall and then things got even better, because the chartered aircraft which taxied up to the gate turned out to be a Monarch Airlines Boeing 720, and I'd never flown on one of those.

Of course I was thrilled at the prospect of going on a 707, especially with only half a Comet-load of passengers, meaning I could sit wherever the hell I liked (yup, you guessed it, window seat right over the wing near the engines). I'm pretty sure I was the only passenger who wasn't annoyed that it was going to fly to Luton and that we'd have to get a coach back home to Manchester from there.

As much as I liked the Comet, when that big 720 taxied up to the pier at Gerona with its spiky antenna on the top of the tail and extremely noisy engines, it looked like a spaceship in comparison to the colloquial-looking de Havilland jet I'd flown out there on, and that kind of thing always impresses kids.

So why this story? Well, the point of this little anecdote from my childhood is that it was like a microcosm of the birth of 707 and how that eclipsed the Comet; the Comet *should* have been there, but ended up being ousted by the Boeing 707 because of a technical problem.

Success in the wake of tragic mistake

Any aeroplane enthusiast will tell you that the de Havilland Comet was the first commercial passenger jet, having made the first revenue flight for a jet airliner in May 1952. Being first should have made it a massive success story, because the Comet was a great aeroplane design.

It had bags of power and it was economical too, if a little small on passenger capacity, but unfortunately, aeroplane buffs will also tell you that the Comet had a fatal flaw when first produced, and that gave Boeing a swing at gaining the lion's share of the passenger jet market in spite of being second in the race to get a jet airliner out of the factory door, and to understand why that was so, we need to look at the story of the Comet.

In its first year of commercial flying, there were a few accidents with the Comet as you might expect with a new and innovative aircraft, however these were pure accidents related to its newness and not a result of that production flaw. Nevertheless, in 1954, a BOAC Comet crashed into the sea near Rome, and this time it was indeed caused by that flaw. Soon after, another Comet fell out of the sky too, and the fleet was grounded until a solution could be found to the mystery of what was causing these incidents.

A lengthy investigation into the Comet crashes ensued - which crucially for Boeing, gave them some time to get up and running with their 707 and make some design changes – the Comet accident probe included the Royal Navy recovering large sections of wreckage from the sea bed, whereupon it was learned that the Mark 1 Comet – with its original square windows – was prone to fatigue cracking at the window

corners owing to the stress of repeated pressurization cycles. A trait exacerbated by the fact that in spite of the Comet having been correctly *designed* to be constructed using a combination of drilled rivet holes and adhesive bonding, *in actuality* it had been punch-riveted, which created much weaker rivet holes with ragged edges in the alloy, and these were an accident waiting to happen with the movement caused by pressurizing the fuselage. Both Boeing and Douglas noted this and avoided making the same mistakes on their first forays into mass producing pressurized jet airliners, and they also revised their designs in terms of passenger capacity too, based on seeing how the Comet was doing.

Needless to say, the design and flawed construction methods used on the original Comet were also refined, and this made the aircraft safer and better, with later Marks being very good aircraft indeed. But by the time that happened, the damage was already done to its reputation and the Boeing 707, the Douglas DC-8 and the Convair 880 were coming off the drawing boards and being flight tested.

Comet test pilot John Cunningham has said that both Boeing and Douglas chiefs privately conceded to him that if the Comet's design and production flaws had not happened to de Havilland, then it would have happened to them, but that was little consolation for de Havilland, and the way was open for Boeing's 707 to pick up the ball and run with it. The Comet on the other hand, played out its remaining career being bought up second hand by airlines such as Dan Air London to supplement their Boeings, while the major airlines bought shiny new Boeings almost exclusively. But in spite of the stroke of luck at the expense of de Havilland misfortune, it wasn't all smooth running for Boeing either.

A shaky start for the 707

Boeing's 707 was initially created in the form of the Boeing Model 367-80, which actually looks a lot like a Boeing 707 at first glance, but in fact it was considerably different to a production 707, being based on a lot of the research Boeing had done for military aircraft such as the B-52 Stratocruiser as opposed to commercial aircraft. When Boeing realized that the prototype rival Douglas DC-8 was going to be a lot wider than their 367-80, it became apparent that having two seats either side of the aisle, as the Comet had, would not make it very profitable to fly, and so they were compelled to redesign it.

This was an expensive change to make, since Boeing had built the 367-80 out of their own money as a proof-of concept aircraft, but in the hope that it would be the basis of a production aircraft with very few changes having to be made to tooling. As it turned out, the changes to the design meant that most of the tooling they had originally created for the expected production run was effectively useless for a commercial version, and so they had to spend even more money on creating what would turn out to be the genuine prototype for the 707 series.

Nevertheless, Boeing was pretty sure the 707 would be a success - even if not immediately so - thanks to a big order from Pan Am which opened the floodgates to a raft of orders from other airlines, as was common when Pan Am made such a choice. This was just as well, since Boeing needed to recover the costs incurred when creating a completely new second prototype and all the tooling and jigs for it. This is in fact a common tale with Boeing, which as a company has always been prepared to risk all with a new type, confident in the knowledge that if they get it right – and fortunately they always have - then commercial success will follow.

The same was true of the 737, which was produced *after* the DC-9, but through good design it was able to eclipse an aircraft which went on sale before it, and the story was repeated again with the 747, which took Boeing to the brink of bankruptcy when being developed, but brought them massive success when it went on sale.

Brits may bemoan the ill fate of the Comet's lack of commercial success in the face of the 707, but it is more than mere luck which has made Boeing the success that they are, and the 707 is only one example of this, with it taking literally decades for Europe to catch up.

To the victor, the spoils

So in late December of 1957, some years after the Comet should have been running away with success, the first real Boeing 707 took to the skies, and crucially, that was five months ahead of the first production DC-8, a type which Pan Am had also ordered. But the first commercial flight for the 707 would not take place until October of 1958, when Pan Am operated the inaugural revenue-earning flight for a 707 from New York to Paris (with a stop off at the coast in order to refuel).

It would be September of 1959 before those who had ordered the rival DC-8 could start operating their aircraft, and that was enough of a coup to seal the 707's success and its place in most people's minds as the aircraft which kicked off the jet age, even if the facts state otherwise - especially the fact that the first 707 types were a bit short on range.

It wasn't until Boeing's own 747 came along that the 707 really began to be eclipsed by another aircraft, which meant that for well over ten years, the 707 ruled the intercontinental skies along with the rival DC-8 to a lesser degree, whereas the third contender in the race – the Convair 880 - fell by the wayside (incidentally Captain Sim, we'd like to see both the DC-8 and the Convair 880 too!).

Even when Boeing built the 747 to offer something that could cope with increasing passengers numbers, they made sure that it had the same ground pressure footprint as a 707, so the legacy of the 707 lived on in the Jumbo in a number of ways, as it does in the 737, since even today, the baby Boeing shares the same cockpit shell as the 707, and the present 737- 900 is almost identical in size and passenger capacity to the 707 too, proving that Boeing really knew what they were doing all those years ago.

Room for improvement

As far as variants of the 707 go, there are quite a few. The first 707 variant was the 707-120, which is the one Pan Am and American Airlines originally ordered. It featured Pratt and Whitney JT3C-6 turbojets and carried up to 179 passengers. Shortly after that, there was the 707-138, which was a specially shortened version of the 707 that Qantas ordered; having a ten foot section removed from the rear fuselage in order to increase its range.

Soon after these models commenced production however, the 707-120B variant became available, this having more powerful Pratt and Whitney JT3D turbofans, which were not only quieter than the earlier variant's engines, but also a lot more powerful. Perhaps more importantly, the 120B also had a few structural improvements, notably a taller tailfin which lessened dutch roll and the addition of some of the wing lift devices which later showed up on the B720. Lots of original 120 and 138 variants were retro modified to 120B standards too.

A short-lived and very rare version (only five built, and one of those was destroyed before being delivered) was the 707-220. It was produced for Braniff and intended for hot and high operations. The 220 featured more powerful JT4A-3 turbojets, but it was essentially eclipsed by the 120B variant, which accounts for the small number of 220s built.

The next major variant was the 707-320 'Intercontinental', which featured JT4A-5 turbojets, a stretched fuselage, enlarged tail surfaces and an enlarged wing. This was what might be considered the first really practical trans-oceanic jet airliner, since it had the range necessary to be able to cross the Atlantic both ways irrespective of unfavourable winds and without the need for any interim fuel stops at coastal airports. The 320 could carry close to 200 passengers too.

Following on from this came the 707-320B ADV (Advanced), which added some leading edge high lift devices, to shorten the take off run required. A 707-320C (Convertible) variant which had a strengthened floor to allow it to have the seats removed and be used as a cargo aircraft soon followed, and many of these were in fact delivered to be used purely in the cargo role.

A chance discovery

An unusual variant was the 707-420, which was ordered by BOAC. This version was equipped with extremely powerful Rolls Royce Conway 508 turbofans. The British certification demands for the flight characteristics of the 707 were partially the reason for a ventral fin showing up on early 707 variants to combat dutch roll, although the larger tail fins of later models made this additional surface unnecessary.

Sadly, a BOAC 707-420 was one of the first jet airliners ever to be lost in violent turbulence, whilst flying near Mount Fuji. As a result of that crash, it was discovered that the bolts holding the tail to the fuselage were undergoing more stress than had at first been thought when the wreckage was examined, and although this was not the cause of the crash, the discovery did lead to a modification being made to all 707s to prevent this from becoming a problem, which is an indication of how the earlier production difficulties of the Comet were not limited to de Havilland alone, and even Boeing could run into potential minefields in the relatively new arena of producing jet airliners.

The last major original 707 variant was the 707-020, which at one point was actually called the Boeing 717, but then later named the Boeing 720. It had some fuselage sections removed from both in front and behind the main wing, making it a little over eight feet shorter than a 120 series 707, and it also had the wing modified to include Krueger leading edge flaps, with the sweep inboard of the engines being increased slightly too in order to increase the wing area.

These changes made the 720 not only faster, but also much more capable of using smaller runways, and until the Boeing 727 came along (which also had those Krueger flaps), the 720 was the aircraft of choice for many airlines because of its versatility of being able to get into and out of smaller airports. A later 720B variant swapped the engines for more advanced Pratt and Whitney turbofans, making it quieter and even more powerful too. The 720s and 720Bs were the fastest versions of the 707 series, but the modifications they enjoyed were also later made available as a retrofit option for earlier 707 variants.

Of all these variants, what we get with Captain Sim's FSX Boeing 707, is essentially three 707-320 models, these being the 707-300, the 707-300B and the 707-300B ADV. And in case you were wondering, the '20' part of the designation is merely Boeing's Customer Code for the most common version, so there isn't a lot of difference between a 300 and 320!

The pretty de Havilland Comet eclipses a 707 at Manchester Airport in this picture, but the reverse was true when it came to lasting commercial success, although ironically, when you look at the cockpit area of that Comet, you can't help thinking it looks a lot like the 787 Dreamliner. Apparent in this photo is the larger size of the 707, despite the fact that both aircraft featured four engines. (photograph: MillbornOne)

This NASA in flight Navy-style drogue refueling demonstration, with a privately-operated Omega Air Refueling Services K-707, shows that even today, the Boeing 707 is at the cutting edge of aviation ideas. The aircraft is in fact a modified civilian Boeing 707-300, which is the 707 variant Captain Sim focuses on in their default FS package, although not with this fancy refueling gear. Sadly, this particular aircraft crashed the day after I acquired this picture for the review, running off the end of the runway when loaded up with fuel, but fortunately, none of the crew were killed in the accident, however, it does mean that Omega now only have one 707 in operation, and operational 707s are just that little bit rarer as a result of this (photograph: NASA)

You've got to roll with it...

So now we know all about the real thing, let's have a look at the Captain Sim FSX version of the Boeing 707. CS did well with their FS9 version of the 707, which is still a pretty nice FS aeroplane, but the FSX version that is the subject of this review is no mere FS9 rehash, it takes the aircraft far more seriously than the previous FS9 effort, making good use of the increased capabilities of FSX by adding a lot more whistles and bells to what was already a pretty complex rendition of the aircraft.

So buckle up, because as any true 707 fan knows, we're looking at the only Boeing jet airliner to have ever performed a deliberate barrel roll as part of its press demonstration flight, and that's something you probably won't see Boeing do again, for B777 Chief Test Pilot John Cashman has stated that just before he piloted the prototype Triple Seven in 1994 for the first time, Phil Condit - Boeing's president at the time – firmly said to him: 'NO ROLLS!'

Captain Sim's FSX 707 is available from their website as a download, which weighs in at 129.84 Mb for the present (V1.3 version) and comes at the now reduced price of 29.99 (Euros), which is approximately 44 US Dollars, this being considerably less than the 4.5 Million Dollars a real one would have cost you back when Boeing first started making them and also less than the 39.99 Euros it was originally pitched at.

Since I tested the CS FSX 707 over a very long period, it being something I bought anyway right when CS released it, I've flown this FS add-on from version 1 up through the various patches to the current one you get if you buy it now, and although it was perfectly flyable and fun upon release, a number of minor glitches were present, but since those glitches have now been sorted out, this review is based solely on what you get if you buy it today.

Note that there are also several expansions available for this product, all priced at 9.99 Euros (approximately 14 US Dollars). The expansions cover the E-3 Sentry AWACS variant, the 300C convertible cargo option variant, and the VC-137 special variant (i.e. what used to be Air Force One), but these are for the most part visual changes, so we're only covering the base package here, which as noted, comprises the 300, 300B and 300B ADV passenger variants.

You can find out more about the different versions available from the Captain Sim website, although they are in fact detailed even in the default version's documentation, since that serves as the manual for all versions.

Installation

Test System

In common with most Captain Sim add-ons you can get as a download, installation is a simple process; double click on the exe file, the thing installs itself in FSX automatically, and then you are asked to fill in your purchase details in pop up menu, whereupon these are checked online and the product is activated and ready

to use.

There is one caveat to this however, Captain Sim's FSX 707 is capable of using an INS, and this is seen modeled in the virtual cockpit right away, but by default it is only the minimally-functional model of the INS on that VC pedestal, in order to actually use an INS to navigate, you have to manually install the CIVA Delco Carousel INS.

The CS 707 manual provides a link to where you can download the CIVA INS, and the installation process is simple enough since you are also presented with a replacement FSX 707 panel configuration file that is ready to go. There is another point worth noting with regard to additional stuff you can download which will make using the INS a bit more practical, but more on this later.

A desktop PC with an ASROCK M3A770DE motherboard, running 4Gb of DDR 3 RAM
ATI Radeon 4800 PCI-x graphics cards with Catalyst drivers.
Operating system: Windows XP Home with Service Pack 3 and DirectX 9.0c.
Peripheral devices: Saitek Cyborg EVO joystick, Saitek rudder pedals and Track-IR 4.
FSX Version was Acceleration, although the CS FSX 707 does not require Acceleration to work.

Flight Test Time:
260 hours. Yup, that's not a typo; I tested this thing like crazy.

Documentation and other downloads

Not included in the initial package, the documentation for the CS Boeing 707 is available as a separate download from the CS website. This is not a bad idea actually, since it means that if there are any patches which require a change to the documentation, it could easily be accomplished. There is no doubt that you ought to give these manuals at the very least a bit of a look, because this is a complex aeroplane – and yes, that is *manuals* as in plural, since there are in fact three of them in total.

Coming in PDF format, the three PDF manuals add up to about 7Mb in total size, these being Part 1 – the **User's Manual**, Part 2 – **Aircraft and Systems**, and Part 3 – **Normal Procedures**. As you can probably guess, the first manual covers the CS product itself, and in great deal detail too, being 39 pages long. In addition to detailing all the animations and fancy features of the CS 707, it also covers the expansion models, there is also some useful information for repainters too, so it is certainly a comprehensive guide to the product, but you'd probably only ever want to check it out the once. It also happens to be the only one with colour pictures.

The other two manuals are more in the mold of the kind of thing which would be given to pilots of the real aircraft, so these are useful as regular reference. Part 2 is 103 pages long and goes into detail on describing the avionics and systems of the aircraft, expanding on several aspects where necessary, for example, there is a mini tutorial on how weather radars work, since the CS 707 has a simulation of one of these, and since that radar is a gauge, with a 2D pop up panel version, you could also borrow it and put it in your other FS aeroplanes cockpits, which adds a bit of value to the package.

I should point out however, that installing the FSX 707 may possibly be guilty of having stopped my standalone CS Weather Radar's installer from functioning, although it could also have been installing CS Weapon which did that, either way, it means I have to do that manually if I want it in any of my FS aeroplanes!

From the amount of pages in all these PDFs, as you might imagine, there is a lot to take in and you can probably gather that this is certainly not a 'lite' simulation of the 707 by any stretch of the imagination. Part 3, at a slightly less lengthy 59 pages, is largely culled from genuine 707 documentation and covers procedures and checklists, with flight planning cards for EPR settings, V speed charts, diagrams of different approaches to land, departure profiles and all that sort of thing.

Since the style of this documentation mimics the real thing as it was back in the Sixties and Seventies, it is in black and white, with only the (Part 1) product guide PDF having any colour pictures in it. Thus it is feasible to print the most useful 59-page Part 3 Normal Procedures

manual without spending a small fortune on toner cartridges.

So if you've ever complained about flimsy or inadequate documentation for an FS aeroplane, this is the kind of thing you won't be disappointed with, although to be super-critical, it could have done with the inclusion of some chart info for EPR settings, of which there is none, but for the benefit of those who want this stuff (and you will if you are into realism), you can find 707 EPR setting info charts here So the omission is not an insurmountable problem.

You get a fair old selection of manuals with the CS FSX 707 (even if you do have to download them separately). These contain *almost* everything you need to be able to fly the thing exactly as per the real deal, although they lack info on EPR settings for the throttle, which you can nevertheless find kicking around on the 'net. On the right you can see the take off performance calculation chart (no TOPCAT or fancy FMC automatic calculations here, you have to do it the old-fashioned way).	

What you actually get to fly

By default, you end up with a decent selection of paint jobs for the 707, although they are for the most part what you might call period paint jobs as opposed to the kind of thing you might see on a 707 today. Since most 707s these days are in fact either military tankers, AWACs platforms, or freighters, this is understandable since the CS model itself is a passenger version, and genuine operational passenger versions of the 707 are a rare thing indeed. The past glory days of the 707 are mostly where it is at unless you buy the additional expansions.

You can see that you get several paint jobs with the FSX 707 base package, and the 300, 300B and 300B ADV variants are indeed different FSX models too.	**Here you can see an external model difference between the 300 and the 300B ADV, where the earlier American Airlines 300 model has a ventral tail fin.**

When you load up either a 300, 300B or 300B ADV into FSX, you will find visual differences on the models, so the variety of paint jobs are a bit more than mere badge engineering. To be honest the differences are fairly minor though, and they don't really affect how the thing flies to any great extent, but it is nevertheless nice to see a bit of variety on your virtual ramp.

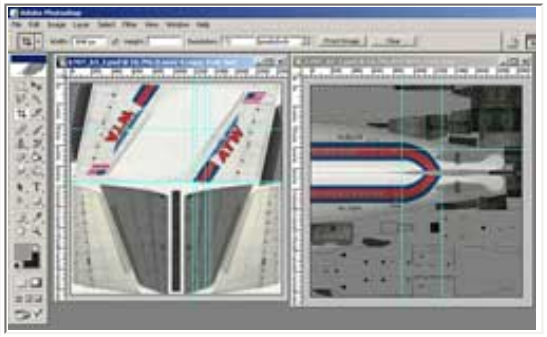
The paint jobs of the included liveries themselves are very well done indeed, helped tremendously by the very high standard of base metal texturing of the common aircraft parts, so that even on fairly modest graphic settings, a visually pleasing experience is to be had when going to external views.

The delightfully colourful livery of Ecuador's now-defunct national carrier, Ecuatoriana is one of the more decorative schemes you get with the CS FSX 707.

Paint your wagon

On the subject of paint jobs, there is a kit for the CS FSX 707 available. It's a fairly simple affair – just three textures in total - which makes it easy to use, but I figured I'd present it with a bit of a challenge in testing it out, so I had a go at creating a livery where the cheat line extends up onto the tail, since this involves matching two separate textures so that they will align correctly.

Some trial and error was required to pull that off, since there are no guidelines to help you when the PSD files are opened up for repainting, thus you have to add these yourself and then have a few swings at it, checking the appearance in FS to determine any necessary adjustments, but this is nothing new to repainters. It is not that hard to achieve something fairly complex with a bit of effort, and really of more importance is the fact that the placement of the textures does allow for stuff up on the top of the model without distorting the projection too much.



Adding some guidelines proved necessary to aid fuselage-to-tail alignment with the paint kit

As you can see from my stab at using the CS FSX 707 paint kit, it is entirely possible to get things aligned nicely in spite of a lack of guidelines on the PSD files, and repainters will note that there is very little distortion of the ATW logo even though it is up very high on the fuselage near the cockpit, so there is scope to do fancy paint schemes without running into projection problems. The sharp-eyed amongst you will know that this is the fictional 'TWA stand-in' airline that appeared on the 707 featured in the movie, The Delta Force – I'm sure Chuck Norris would be proud of me! The real aeroplane which was used for that movie was originally a Pan Am aircraft, and not a 300 variant, but why let facts get in the way of a fun repaint eh?

Performance and quality

Most people will probably be aware that if CS aeroplanes are about anything, it is detailed virtual cockpits with a photo-realistic look and exterior models with every whistle and bell you can imagine, and the FSX 707 is no exception. But as nice as it is to have a pretty VC and fancy external model, that approach invites being a drain on your CPU cycles.

In the past, this has been a criticism leveled at Captain Sim perhaps more than any other developer, with their Boeing 757 for FSX bearing the brunt of these criticisms. Thus it is pleasing to note that the FSX 707 performs admirably in FSX, which is just as well, since it would be a real shame if such a nice VC were unusable. Of course, some of this will be down to the simpler avionics a 707 has in comparison to a 757, but to be fair, with an INS, Doppler system and a weather radar all humming away, it would tend to suggest that CS have got their act together a bit more where providing looks *and* performance is concerned, since it does in fact run very smoothly indeed.

Another criticism that CS have come in for in the past, is silly little glitches, and the length of time taken to address them. Well, the truth is, there were indeed some glitches on the CS FSX 707 when it first came out - for example some of the eye candy animations didn't work - but the good news is, these and a few other glitches have largely been addressed and the CS FSX 707 is now a very solid performer with little to cause complaint. So this is another thumbs-up for Captain Sim. Having said that, there is still the odd silly mistake in there which needs fixing, nothing major, and in fact the user can fix them, but they are nevertheless there.

Silly mistakes such as this typo on the Ready light for the INS alignment remain in the latest incarnation. This can be fixed by the user easily enough, but it should have been spotted and corrected. In fairness though, such things are minimal and there are no glitches which would get in the way of using the CS FSX 707.

Visuals

Looks might not be everything, but they help, and as most people will be aware, the visual aspects of Captain Sim's catalogue of add-ons have always been a strong point. The CS FSX 707 continues the grand tradition of ramping things up looks-wise.

For a start, there are literally hundreds of custom animations in the CS FSX 707, with everything from fuel dumping showing up on the external model, to the armrests in the passenger cabin being adjustable. In short, if you can put your mouse on it, regardless of what it is, it will probably function in some way or other.

The familiar CS pop up animation control panel commands many of the more simulation-based animations, such as opening the radome and adjusting the antenna, which might seem a frivolous touch, but it does nevertheless add to the feeling that the aeroplane is more than merely a bunch of pixels. In the VC, the visual treats continue, but they don't seem to slow the frame rates down very much, which is perhaps a feature more welcome than all the others combined.

You can find plenty of screenshots of the CS FSX 707 kicking around on the 'net, so I won't go mad showing a stack of them in this review, but here are a few…

The 2D animation control panel can be seen in this screenshot, and you can see the engine covers on, the cowling removed to reveal the engines, the emergency slides deployed, the radome opened with the radar panned to starboard, the remove before flight tags in place, the chocks in position and both external air and power have been connected using this panel too.

Here you can see that even the burnished flush riveting of the engine cowlings is in evidence, and it is apparent in this screenshot how good a job has been made of depicting the metal sheen and the dirt and staining these things accumulate.

The VC is well on par with other Captain Sim efforts, with their well known slightly care-worn look. Most switches function in some way or other.

The engineer's panel is fully modeled and you will need to use it to perform certain tasks, but it is nevertheless possible to start the CS FSX 707 with a quick 'Control+E' if you wish to do so.

Visible in this screenshot is the Pittsburg Plate Glass Company's PPG logo that you find on the real 707's triple-laminated windows, as well as the elements for the windscreen's heating system. Notice too the scratches on the molding above where the grab handle is, which are common on the real thing after the sometimes awkward shuffling necessary to clamber into the pilot's seat of the average Boeing. There are a lot of nice touches such as this in the CS FSX 707's VC, including traces of fingerprints on the radar screen, which you may just be able to discern on one of the other screenshots in this review. Also visible at the bottom left of this picture is the familiar CS panel icon 2D pop up.

2D panels are not forgotten in the CS FSX 707. Here we can see the panel for the weather radar and the pop up panel to assist in using the Doppler navigation system, the controls for which, sit just to the left of the radar on the centre pedestal.

With the CIVA Delco Carousel INS installed, more 2D pop up panels become available, here you can see the three that are associated with that system, including the ADEU (Automatic Data Entry Unit) card loading slot for automatically inserting flight plans, as well as the engine instruments on the centre of the VC panel. Visible in the ADEU slot, you can see the file name of my Electronic Flight Bag flight plan from EGCC to LEAM which I converted to the required format for the CIVA INS with the freeware conv2adeu **utility you can find on Avsim's file library, this being section three of that converted plan, which I was loading into the INS en-route after section two had been flown.**

A limitation with the CIVA INS and the depiction of it in the CS FSX 707's VC is the fact that the INS head's buttons are non functional in the VC with the exception of a few lights. You can press the buttons on the VC's INS unit, but they won't operate anything, for that you'll need the 2D panels. The VC rendition of the INS head will only display the current position, whereas the 2D CIVA unit will function as per the

real thing, allowing you to monitor a variety of data. In practice this is actually quite useful though, since it means that with only one INS head you can in fact monitor your position on the VC INS and another parameter on the pop up panel, at the same time!	
	Smoking or non-smoking? If you were wondering why aircraft such as the 707 have largely been banished from the skies these days, one look at that exhaust trail will answer the question.
If you fancy being passenger 57, then you certainly can be in this thing, since the entire interior is fully modeled, meaning you can 'walk' the viewpoint from the pilot's seat right down to the back of the aircraft. Lots of those cabin details work too, so this is one FS bird where you really can ensure your seat backs and tray tables are in the upright position in preparation for landing.	

The real test…

So, it looks nice, it runs nice and it has nice equipment and documentation. But this would be all for nothing if it didn't fly nicely as well, thus it was time to take it for that all important Avsim review test flight, which actually was several hundred test flights in reality, but for the purposes of this review I've condensed it down into one.

Since we are talking about a rather old aeroplane here, one which nowadays rarely gets used on passenger flights, and certainly not with the original noisy turbojets, it can be a bit difficult to determine whether the CS version actually does perform as per a real Boeing 707 did in its heyday, because what we are effectively testing is a snapshot of history rather than what a 707 these days would operate like.

So for the purposes of this review, I took the trouble of tracking down and buying a genuine copy of FCT 707 (from www.esscoaircraft.com).

FCT 707 is the Boeing 707 Flight Crew Training Manual for the 707-300B ADV variant (for the real propeller heads out there, my copy was revision four, dating from April 1973). Having something like that to hand enabled me to test fly the CS FSX 707 quite literally 'by the book' and see if it behaved as Boeing's documentation claims it ought to. So, I loaded up the Pan Am 707-300B ADV variant, and set about testing things out.

For this test flight, I picked my good old favourite route of EGCC to LEAM (Manchester, UK to Almeria, Spain), which is a trip of around about 1,000 nautical miles. That's a short trip for a 707, but as noted in the little anecdote at the start of this review, not an entirely unrealistic one for a 707.

The CS FSX 707 comes with a handy configuration tool which lets you pre-save load outs of passengers and cargo, so I went for a fairly full cabin and a fuel load that gave me a gross weight of 288,453 lbs, which is well under MTOW, but not exactly lightly loaded.

The load manager will let you save your favourite configurations so the CS 707 loads up that way in FSX. It's worth noting here that you'll need to have values in pounds rather than kilograms, since you need to know the weight in pounds in order to use the V-speed charts in the manuals, and they date from a time when pounds was the value that was used almost exclusively on most airliners.

By the book

Having loaded up the sim, I checked the CS Part 3 manual to find the V-speeds required for a temperature of 14C at Manchester. This equated to V1 at 136 knots, Vr at 142 knots and V2 at 158 knots. Cross-checking this with the genuine Boeing manual showed that to be correct, so the data in the CS manuals is indeed as per the real thing.

I found that I should be retracting the flaps after take off from V2+30 knots up to V2+50 knots, and aiming for a climb speed of V2+70 knots when everything was cleaned up. All of this stuff is especially important for the 707, since it uses a lot of runway because it does not have all the Krueger flaps of the 720 variant, so if you don't rotate it at the right speed, it'll cause problems – rotate too early and you'll delay lift off and climb out too slowly, rotate too late and you'll possibly overheat the tires and also risk not clearing obstacles at the end of the runway.

You'll need every inch of that runway with the 707.

There are three movable speed bugs on the ASI, and so I set these to the V1, Vr and V2 values and then taxied out to the UK2000 payware scenery version of Manchester's 10,000 foot-long runway 05L, which would give me a right turn after take off if I were to head directly en-route. Knowing the engines accelerate the aircraft fairly slowly initially, I made sure to taxi the 707 right up to the end of the runway run off area before turning to line up, since every inch of tarmac counts where the 707 is concerned.

Putting those ASI speed bugs on the right settings for your take off weight and temperature settings is important, and you can find that info in the CS FSX 707's Part 3 manual.

As noted earlier in this review, you can integrate the CIVA INS into the CS FSX 707, and this I had done, but it is also worth noting that you can get a rather useful little flight plan conversion tool from Avsim's file library called 'conv2adeu' which was created by Brian Dunham. This will allow you to convert FSX flight plans into the ADEU (Automatic Data Entry Unit) format which the CIVA INS can then import, which is useful because otherwise you'd have to manually key in all the Lat and Long locations for a flight plan, and there are about 35 of these for EGCC-LEAM if you include SIDs and STARs, so it saves a lot of time, and since it can in fact be difficult to determine the latitude and longitude for waypoints not on navaids in FS, that utility really is a bit of a must-have for flexibility in flight planning.

The CIVA INS cannot load a huge number of waypoints, so you have to load them a few at a time, but, conv2adeu splits your FSX flight plan

into convenient chunks in order to make that painless. This system is akin to the real Delco Carousel INS, which was able to read data cards that would be inserted into a little card reader slot on the overhead, which means you are pretty much doing what the real thing could do.

Sometimes aircraft would have several INS units, with different sections of the route in each one, but with only one INS unit in my 707, I loaded the flight in sections, simulating having several data cards for the route. If this sounds complex, it really isn't in practice, in fact it is no more difficult than using an FMC and in many respects actually easier, so don't let this put you off having a go with the freely-available CIVA INS - even if you don't have the CS 707 - since it really is good fun, just remember to read the manual for it.

Several ways to go

INS is in fact only one of several ways you can navigate the CS FSX 707, since you could also fly it using VOR to VOR navigation, or with the fully-simulated Doppler navigation system, whereby it emulates the real system of having four radar beams in a cruciform pattern pointed down at the ground which detect groundspeed and drift.

With Doppler navigation, the aircraft picks up signal returns and determines movement by analyzing the Doppler shift of the signals reflected off the Earths' surface. If that sounds complicated, like INS it actually isn't hard to use in practice, where it is all done via a panel on the left of the forward pedestal. Captain Sim certainly get a big thumbs up for having simulated being able to do it in FSX, since either that, or INS navigation were the only two practical means to navigate the 707 across large stretches of water, where there were of course no radio beacons to steer by and celestial navigation wasn't really practical. But for my test flight, INS was the one I chose to use, so on with that we go...

So, having set up the INS, figured out all the V speeds and taxied to the runway, it was time to let her rip. Now, this is where things do deviate a bit from reality, because in reality, you'd know what EPR settings (Engine Pressure Ratio) to use from having a set of charts and consulting with these based on airfield elevation and OAT. In fact, the correct technique according to my trusty Boeing manual, is to open the throttles up to about 70 percent, and when the aircraft is rolling at between 40 and 80 knots, you adjust the throttles to get the correct EPR settings on the gauges, which was achieved by having a fairly strict procedure with regard to pilot and co-pilot responsibilities for who was doing what during that part of the take off roll.

This brings up another point incidentally: On the real 707-300B, you can test the take off configuration by opening up the number three throttle to 70 percent and get a warning horn if something is wrong since that's the one the system is connected to, but the CS FSX 707 doesn't have that simulated, so don't forget to set those flaps. Anyway, back to the take off…

In lieu of having no co-pilot to hold the controls whilst I adjusted the throttles for the correct EPR, I simply whizzed the throttles forward to get about 2.2 on the EPR gauges and left it at that initially, then a minor tweak just as we neared 50 knots to get some speed on the clock saw the thrust setting right. I suspect that the CS FSX 707's relationship between throttle settings, temperature and EPR readings is probably not a very close simulation of the real thing, which might explain why there are no EPR charts in the manuals, with the EPR gauges being more in the nature of eye candy, but I wouldn't swear to that.

I do know that this was more or less the case with the CS FSX 727, so I'm presuming the same is true here. If you want to know a bit more about EPR and how all that works by the way, I went into that in some detail on the Avsim review of the CS Boeing 727 by the way, so you can check that out if your thirst for knowledge is strong enough!

Anyhow, with the throttles opened up, the CS 707 started rolling and it initially built up speed fairly slowly, which has you watching those speed bugs and anxiously waiting for the airspeed needle to come alive. However, once the throttles were pushed up a bit more it gets speed on the clock reasonably fast, and there was still a fair bit of runway 05L's tarmac ahead of me when Vr came around, at which point I

brought the stick came back at the recommended degrees per second rate of rotation and up the nose went and the wheels unstuck.

This was quite impressive really, because it seems to me that the thing was pretty close in terms of wanting to fly at the right speed for the temperature and weight, and it did indeed climb out just as the Boeing manual said it should. This was not the first time I'd flown the CS 707 of course, so I already knew it was pretty good, but it was the first time I'd meticulously checked it against what the books said it should be doing at every stage and carefully noted it all the way. I was impressed with how well it mimicked what the real thing is supposed to do.

In spite of the slightly dubious EPR simulation, it seems to me that the CS FSX 707's flight model does a good job of wanting to fly at the right point on the take off roll for a given weight and temperature.

Once off the deck and up to speed, the CS 707 actually flies really nicely and is easy to trim into a decent climb, so it can be hand flown or you can use the autopilot. As far as I can tell from that Boeing manual, it appears to be pretty close to the mark as far as building speed, holding pitch and its roll rate goes. It is possible to overspeed the thing at light loads if you don't watch the throttles, but having said that, it is quite convincing so long as you keep a close watch on the throttle settings, whereupon it will settle nicely into a convincing climb.

Popping the autopilot on will have it tracking the INS route nicely too. It's not as easy to fly as a modern jet, since the workload is undoubtedly higher than on an FMC-equipped aircraft in terms of staying on top of things as far as automated climbs go, because there is no MCP with automatic altitude capture, LNAV or VNAV on the autopilot, but it is by no means some terribly difficult nightmare to tame and in fact it is very enjoyable to steer it around by hand.

Moreover, the slightly bigger workload of keeping the INS updated, working the trim and autopilot and crosschecking it with a chart or VOR triangulation to make sure you are on course, makes for an interesting trip that will hold your attention better than simply hitting LNAV and VNAV, as you would on a modern jetliner.

The CIVA INS works well in combination with the CS FSX 707. Note that Avsim forum regular CoolP has done a lot of good work on creating custom install config file guides for this which you can find on the CS forums, so be sure to check that out. Also visible in the screenshot is the 2D map panel that comes with the CS 707, which is useful for checking the veracity of the INS, although to be honest I was more inclined to use either the Flight Keeper ACARS or EFB's charts instead of that, but if you don't have these, what you get by default is perfectly adequate for the job as you can see.

At the aircraft's weight on the test flight to Almeria, 32000 feet was about the practical ceiling limit, cruise speed was a swift .82 Mach, although there was a cross/headwind component slowing things down in places. The wind shifted enough to make an approach into runway 26 at Almeria, which I had already planned for and that is a 10,000 foot long strip of tarmac. Since I was unlikely to use a vast amount of the 707's fuel capacity on a European hop, I figured I'd be on the heavy side when landing so I decided to go with full flaps.

This is one of the (minor) downsides of the CS 707, in that you will have to experiment to find out how much fuel to take along, since this is probably never going to get support from TOPCAT. Having said that, 'tankering' fuel about for a return trip was more common in the 707's heyday, when fuel economy was less of a concern because of the lower price of jet fuel back then, which is basically what I was emulating on this test flight.

Descending the CS 707 calls for a bit of forward planning of course, since there is no FMC to help you out on that score, but a bit of common sense and the 3 in 1 rule of thumb works pretty well. You do need to get the speed off pretty early though, because the 707 is a slippery so-and-so, especially when going downhill.

A good way to figure that out is to fly a route with something more modern that has an FMC, note the distances and deceleration points, and then duplicate those on a flight with the 707. Once you've done that a couple of times, or flown it along a route with a flight profile with which you are familiar, you'll have a good idea of when to start it down.

Checking the Captain Sim Part 3 Manual's charts for landing configurations and bug speeds, then cross-checking that with my trusty Boeing FCT 707 manual, which again confirmed the figures were accurate in the CS manual, I found that at 248,900 lbs coming over the fence at Almeria, I'd need a threshold speed of 137 knots with full flaps and that the 707 would quit flying completely at 110 knots.

So I added 10 knots to that Vref 'for luck' as the wind was a bit choppy as it often is at LEAM with it being on the coast and pretty warm, which would give me about 147 knots to aim for coming over the perimeter track. I did actually use the VOR/LOC to line up on runway 26, since LEAM can be a bit tricky to spot from a long way out, but once the flaps and gear were down, I went to manually fly the approach, even though I do know the CS 707 will happily fly an automatic one.

With the inertia of the CS 707 being fairly convincing - which is in fact one of its really strong points - I found it best to come in at about 155 knots and then let the speed bleed off as the airport went underneath the nose, which did actually mean I went over the piano keys at almost exactly 137 knots.

This is one of the very nice things about the CS 707, the inertia and drag is so convincingly done that it makes judging stuff like that pretty easy to do once you have a few trips in it under your belt, and when you point the thing somewhere, it stays pointed in that direction very well, making manually bringing it in a real joy. With only reverse thrust and a bit of firm manual braking, I was slow enough to easily make the main runway turn off in spite of a fair bit of fuel still on board.

And there it was, a flight from England to Spain in the 707, navigating with INS, and one in which the CS simulation of the 707 performed as per the book in every respect.

	The CS 707 is easy to get in a stable condition in dirty configuration. Here I've got everything hanging out with full flaps, which wasn't strictly necessary, but there you go. For movie trivia fans, those are the Sierra Nevada mountains in the background, and it was up in those that all those stylish Spaghetti Westerns such as the A Fistful of Dollars were filmed, the sets for which are still there, and very cool they are too.
With predictable flight characteristics that match the book figures very closely indeed, the CS 707 was easy to bring in absolutely nailed on the threshold reference speed.	
	Bit off centre because of a slight crosswind off the Mediterranean (or at least that's the excuse I'm using). Still, any landing you can walk away from…

Manual braking and reverse thrust, plus a spell with the nose held off to aerodynamically slow things down a bit, is enough to pull the CS 707 up in plenty of time. It gets trickier if you use something like TSR Autobrake as I usually do, but on this occasion it was FSX alone.

Straighten up and fly right…

Now, that test flight is just one of very many I did with the CS 707 for the purposes of really examining the CS 707 in some detail, in fact it is safe to say I flew my ass off with the thing in testing it over literally months, but the one you've just read about serves as a good average of what to expect.

So I can tell you that I was always very impressed with the way the CS 707 emulates the real thing as far as going by the book's numbers is concerned, because I've done that stacks of times and it is always bang on the money. It's true that some of the systems are not one hundred percent as per the real thing if you delve deeper, although you'd probably have to know the real aeroplane rather well to spot most of those things, so when it comes to actually simulating *flying like a 707*, which is the part that really matters most, it seems to be right up there with the best in terms of being faithful to the real aeroplane's flight dynamics.

As real as you want it to be

To clarify the things that are perhaps not as realistic as they could be with the CS 707, I'll give you a couple of examples and then you can judge for yourself if you think these matter.

You can crank more than one engine at once and still have them start, whereas on the real thing there would not be enough compressed air available to actually do that, and you can push back with the ground services connected and they will remain available even though in reality you'd have pulled the connecting hoses and leads off.

This is the kind of stuff I mean when I say not as realistic as they could be, but personally, I don't think these things matter one bit because if you follow the correct procedures, you'd never know these unrealistic things were possible. You can simply operate the thing as you would the real one, and sure enough it will work like a real one.

If you want an example of that, how about the fact that you have to choose either low pressure or high pressure start sources on the overhead panel depending on what power source you are using to crank the engines? So long as it has stuff like that, I think it is realistic enough for anyone.

Conclusion

So what does all this boil down to? Well, it means that Captain Sim have a classic FSX airliner that looks right, flies right, gets the frame rates right, gets the systems right, and for which the price is right.

It's been a long time coming, but this really is a CS add-on aeroplane which ticks all the right boxes, and it does the real aircraft proud as a fitting tribute to the jet airliner that started it all for Boeing. Recommended? Yup, sure is.

What I Like About The 707-300
• Unscripted documentary that portrays the true to life daily activities of pilots • Creative editing and camera views • Amazing scenery • Features very unique aircrafts and destinations • Pilot interaction with the viewers makes you feel part of all the action

What I Don't Like About The 707-300
• My only suggestion would be to have a segment of the DVD that provides more background on the airline itself.

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